

CHAPTER 1

Introduction

1.1 Purpose

The United States (U.S.) Environmental Protection Agency (EPA) developed this Handbook to promote national consistency when assessing and managing risks associated with lead-contaminated residential sites under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), commonly known as Superfund. This is an update to the *Superfund Lead-Contaminated Residential Sites Handbook*, August 2003 (U.S. EPA 2003a), reflecting best practices, guidance, and policy for lead site characterizations, risk assessments, and risk management.¹

The primary audiences for this Handbook are Superfund Remedial Project Managers (RPMs), On-Scene Coordinators (OSCs), risk assessors, and Community Involvement Coordinators (CICs) working on site characterization, cleanup of lead-contaminated residential sites, and communication with communities. However, it may also be applicable to Resource Conservation and Recovery Act (RCRA) project managers, state and local governments, other federal agencies, tribes, public interest groups, private industry, or anyone evaluating and addressing lead-contaminated residential sites.

The purpose of this Handbook is to:

- Provide insight on site assessment, characterization, community involvement, and health education;
- Describe approaches used in risk assessment and risk management at lead-contaminated residential Superfund sites; and
- Discuss approaches for reducing human health risks related to exposure to site contamination.

This Handbook encourages best practices in the characterization and cleanup of lead-contaminated residential sites, while retaining the flexibility needed to address community

¹ Although this Handbook supersedes the 2003 *Superfund Lead-Contaminated Residential Sites Handbook*, it does not supersede or modify any other existing EPA guidance or policy, nor does it suggest that CERCLA authorities are to be applied at all lead-contaminated residential sites. Rather, these references are provided to the reader as resources to be considered in developing site characterization and cleanup strategies under whatever regulatory or non-regulatory approach is appropriate at a site. However, the National Oil and Hazardous Substances Pollution Contingency Plan (National Contingency Plan or NCP) should be followed, and other applicable guidance should be consulted when addressing lead-contaminated residential sites under CERCLA.

needs and site-specific variables. In all cases, reviewing and understanding the site history (*e.g.*, type of lead site, mode of lead deposition, fill activities, previous disease surveillance) is necessary when characterizing a site.

Generally, CERCLA response² actions are undertaken to address a release, or the threat of a release, of a hazardous substance, pollutant, or contaminant, such as lead, into the environment that presents, or may present, an unacceptable risk to human health or the environment. EPA notes: “When the PRG (*preliminary remediation goal*) or MCS (*media cleanup standard for RCRA*) is exceeded, remedial action (RA) is generally recommended” (U.S. EPA 1994a).

Lead contamination found inside homes may be caused by deteriorating lead-based paint (LBP), plumbing, or other sources not resulting from a release into the environment, and may therefore be more appropriately addressed by authorities and programs other than CERCLA.³ In some situations, it may be appropriate to use CERCLA authorities to conduct sampling and site characterization activities to determine the source of the lead contamination, differentiate between various site-related sources, and help determine if action under CERCLA may be the appropriate authority to use to address unacceptable risk.

Lead-contaminated sites may also contain other metals such as zinc, cadmium, and arsenic. This Handbook, while primarily focused on addressing lead contamination, may also be appropriate for use in the characterization and assessment of risk at sites contaminated with other metals. Typically, this Handbook addresses sites where lead contamination has resulted predominantly from primary or secondary lead smelting, battery cracking, mining and milling operations, and other industrial/commercial releases of lead to the environment. Lead and other potentially toxic metals originating from paint and dust, along with other sources of lead and other toxic metals, may also be present in various media at these sites; however, these additional sources may be excluded from response actions under CERCLA by regulatory or policy exclusions. Refer to Chapter 2 for additional information on CERCLA response limitations.

Residential properties are defined in this Handbook as any area with high or unrestricted accessibility to sensitive populations (*e.g.*, young children less than [$<$] 7 years old), and includes, but is not limited to, properties containing single- and multi-family dwellings,

² CERCLA response actions encompass removal and remedial response activities; see 42 U.S.C. § 9601(25) for more information.

³ Lead contamination found outside of homes and throughout communities may also be from a variety of sources, including historic deposition from burning of lead-containing fuels or industrial sources such as mining, manufacturing, and poor waste management practices.

apartment complexes, vacant lots in residential areas, schools, daycare centers, community centers, playgrounds, parks and other recreational areas, green ways, and any other areas where young children may be exposed to site-related contaminated media (U.S. EPA 1998, 1997a, 1996a). This Handbook defines sensitive populations as young children under 7 years of age because they are the most sensitive receptor for residential land use areas. That is, children <7 years of age are the most vulnerable to lead poisoning and have the greatest exposure because of their relatively small body mass (U.S. EPA 2024, CDC 2012, 2005, U.S. EPA 1990a, 1986) and the sensitivity of the developing nervous system to the effects of lead (U.S. EPA 2024, CDC 2012). Lead response efforts for residential sites under CERCLA are based on protecting the most sensitive receptor and thereby protect all other residents in the process (including older children, pregnant women, and other adults). For other sites, the most sensitive receptor is the fetus of pregnant women (U.S. EPA 2003b). Other EPA guidance (U.S. EPA 2001a, 1995a) and local zoning regulations should also be consulted to determine which properties may be considered as potential or future residential properties or present other unique exposure risks.

1.2 Scope

The scope of this Handbook is limited to addressing soil lead contamination at residential sites that may result in unacceptable blood lead levels (BLLs) in sensitive populations. This Handbook describes some of the key considerations for assessing and addressing soil lead contamination at residential CERCLA and RCRA corrective action sites and encourages users to refer to supplemental guidance and/or policies to consider site-specific factors as warranted.

This Handbook does not address:

- Carcinogenic risk;
- Risks associated with the inhalation of lead in ambient air;
- Ecological risks from lead and lead sites;
- Non-residential Superfund site scenarios; or
- Preliminary assessment/site inspection activities.⁴

⁴ EPA recommends consideration of this Technical Guide when undertaking removal actions, remedial actions, pre-remedial investigations, remedial investigations*, and five-year reviews (FYRs) and selecting remedies under CERCLA. *CERCLA authorizes the EPA to identify and prioritize which sites warrant further investigation to ascertain whether remedial action is needed. The Hazard Ranking System (HRS) is the statutorily required method for evaluating and identifying sites for placement on the National Priorities List (NPL).

This Handbook does not, outside of the scope of the CERCLA response, apply to lead-contaminated residential sites addressed under Title 24, Part 35 (HUD 2004). References are provided to the reader as resources to be considered in developing site characterization and cleanup strategies under whatever regulatory or non-regulatory approach is appropriate at a particular site.

Although this Handbook does not specifically address non-residential areas (*e.g.*, lead-contaminated commercial or industrial properties) or sites where ecological risks are the primary concern, general concepts and practices outlined in this Handbook may be useful when assessing exposure to lead at such properties or if redevelopment could result in residential land use. This Handbook also provides information applicable to assessing risk for non-residential land use areas where children spend time (*e.g.*, parks, playgrounds, schools, beaches, water bodies).

For clarification of terms used throughout this Handbook, refer to Appendix A.

1.3 Overview of Document

Chapter	Overview of Contents
Chapter 1 – Introduction	Provides the purpose and scope of this Handbook
Chapter 2 – Background and Authorities	Provides background information on lead and CERCLA’s authority and limitations when dealing with lead contamination at a Superfund site
Chapter 3 – Superfund Site Team and Collaboration	Provides information on the EPA Site Team and collaboration to address multiple sources of lead contamination and facilitate health education
Chapter 4 – Overview of Community Involvement	Provides information on community involvement activities and resources available to the project team
Chapter 5 – Health Education	Provides information on public health education and the Agency for Toxic Substances and Disease Registry (ATSDR)
Chapter 6 – Site Characterization	Provides information on sampling access, methods, units, preparation, and analysis
Chapter 7 – Source Attribution for Lead Contamination at Superfund Sites	Provides information on source attribution techniques that may be used at sites
Chapter 8 – Residential Lead Risk Assessments	Provides information on data evaluation, exposure assessments, calculating an exposure point soil lead concentration, the Integrated Exposure Uptake Biokinetic (IEUBK) Model and its limitations, toxicity assessment, and risk characterization

Chapter	Overview of Contents
Chapter 9– Implementation of Cleanup Level Selection	Provides information on selecting cleanup levels, PRGs, prioritizing response actions, yard cleanup specifics, application of cleanup numbers and remediation, and other cleanup considerations including background lead concentrations and prevention of recontamination
Chapter 10 – Institutional Controls and Reuse	Provides information on land use controls including engineering controls (ECs) and institutional controls (ICs), such as types of ICs and returning sites to safe reuse
Chapter 11 – Five-Year Reviews for Superfund Sites	Provides information on the Five-Year Review (FYR) process to determine if the remedy is, or will be, protective of human health and the environment
Chapter 12 – Federal Facilities	Provides information on assessing lead risk at federal facility sites
Chapter 13 – Cleanup Documentation	Provides information on providing a ‘clean’ letter to the property owner
Chapter 14 – Access and Enforcement Considerations	Provides information on gaining access and response actions
Chapter 15 – References	Provides full citations for references cited throughout this Handbook